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HQd Portable Meter User Manual

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Section 1 Specifications

Specifications are subject to change without notice.

Meter specification	Details
Dimensions	19.7 x 9.5 cm (7.75 x 3.75 in.)
Weight	335 g (0.75 lb) without batteries; 430 g (0.95 lb) with four AA alkaline batteries
Meter enclosure	IP67, waterproof to 1 meter for 30 minutes
Battery enclosure	Water resistant to 0.6 m (2 ft) for 15 seconds
Power requirements (internal)	AA Alkaline or rechargeable Nickel Metal Hydride (NiMH) batteries (4); battery life: > 200 hours
Power requirements (external)	External power adapter: 100–240 VAC, 50/60 Hz input; 4.5 to 7.5 VDC (7 VA) output
Storage temperature	–20 to +60 °C (–4 to +140 °F)
Operating temperature	0 to +60 °C (32 to 140 °F)
Operating humidity	90% (non-condensing)
5-pin input connector	M-12 connector for IntelliCAL probes (mV/ORP/Redox)
8-pin input connector	The 8-pin connector enables USB and external AC power connectivity
USB/DC adapter	Peripheral and host
Data memory (internal)	500 results
Data storage	Automatic in “press to read” mode and interval mode. Manual in “continuous read” mode.
Data export	Via USB connection to PC or USB storage device (to its storage capacity). Transfer entire data log or as readings are taken.
Languages	English, French, German, Italian, Spanish, Danish, Dutch, Polish, Portuguese, Turkish, Finnish, Czech, Russian
Temperature correction	Off, automatic and manual (parameter dependent)
Measurement display lock	Continuous measurement, interval or “press to read” mode. Averaging function for LDO probes.
Keyboard	External PC keyboard connector via USB/DC adapter

Section 2 General information

The information in this manual has been carefully checked and is believed to be accurate. However, the manufacturer assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, the manufacturer reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation.

Revised editions are found on the manufacturer's website.

2.1 Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger, warning and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of hazard information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

Notice: *Indicates a situation that is not related to personal injury.*

Important Note: *Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.*

Note: *Information that supplements points in the main text.*

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. ***Note:*** *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.*

2.2 General product information

2.2.1 Overview

The HQd series portable meters are used with digital IntelliCAL™ probes to measure various parameters in water. The meter recognizes the type of probe that is connected to the meter. Data can be stored and transferred to a printer, PC or USB storage device.

The HQd series meters are available in 4 models:

- **HQ11d**—pH/mV/ORP
- **HQ14d**—conductivity, salinity, total dissolved solids (TDS), resistivity
- **HQ30d**—all IntelliCAL probes, 1 probe connector
- **HQ40d**—all IntelliCAL probes, 2 probe connectors

Features common to all models:

- Auto probe recognition including serial number
- Calibration data is stored in the probe
- Methods for regulatory compliance and Good Laboratory Practice (GLP)
- Security Options
- Real-time data logging via USB connection
- Internal data storage of 500 results
- USB connectivity to PC/printer/USB storage device/keyboard
- Sample ID and Operator ID for data traceability
- Power from AA alkaline or rechargeable nickel metal hydride batteries, or AC adapter
- Adjustable automatic shut-off for extended battery life
- IP67 (waterproof to 1 meter for 30 minutes, excluding battery housing. Battery compartment submersible to 0.6 meters (2 feet) for 15 seconds)

2.2.2 Component List (HQd 40 model)

Refer to Figure 1 to make sure that all components have been received.

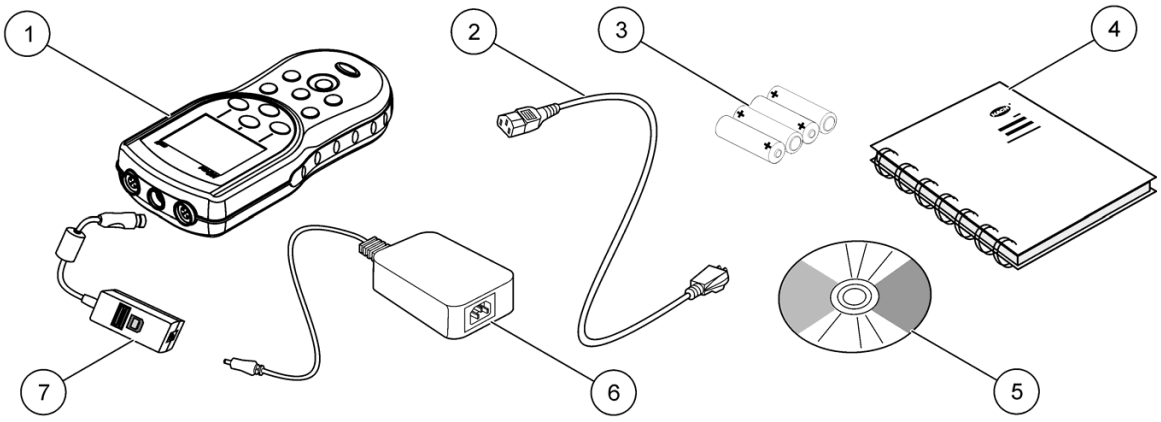


Figure 1 HQ40d components

1	HQ40d meter	**5**	HQd/IntelliCAL Documentation and Advanced Operations CD
2	AC power cord	**6**	AC-DC power supply
3	AA batteries (4)	**7**	USB/DC adapter
4	User manual		

2.2.3 Component list (HQ11d, HQ14d, and HQ30d models)

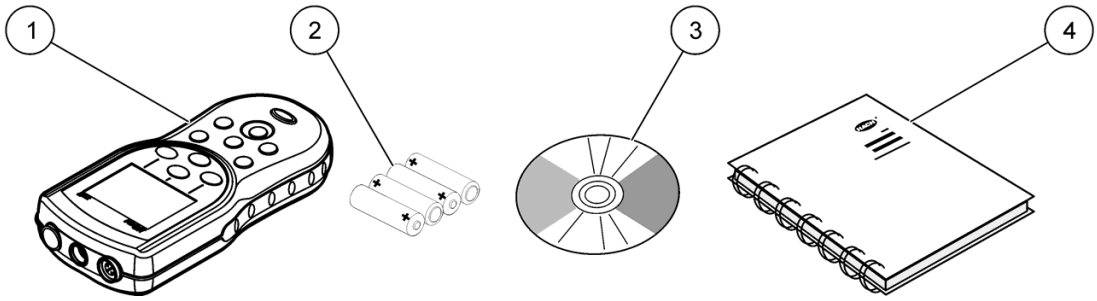


Figure 2 HQ11d, HQ14d, HQ30d components

1	Meter	**3**	HQd/IntelliCAL Documentation and Advanced Operations CD
2	AA batteries (4)	**4**	User manual

Section 3 Installation

3.1 Battery installation

WARNING
Fire and explosion hazard. Use only alkaline or nickel metal hydride batteries in the meter. Other battery types or incorrect installation can cause a fire or explosion. Never mix battery types in the meter.

The meter can be powered with AA alkaline or rechargeable nickel metal hydride batteries. To conserve battery life, the meter will power off after 5 minutes of inactivity. This time can be changed in the Display Options menu.

Procedure for battery installation:

1. Pull the release tab on the battery cover and remove the cover (Figure 3).
2. Install 4 AA alkaline or 4 AA nickel metal hydride batteries. Make sure the batteries are installed in the correct orientation.
3. Replace the battery cover.

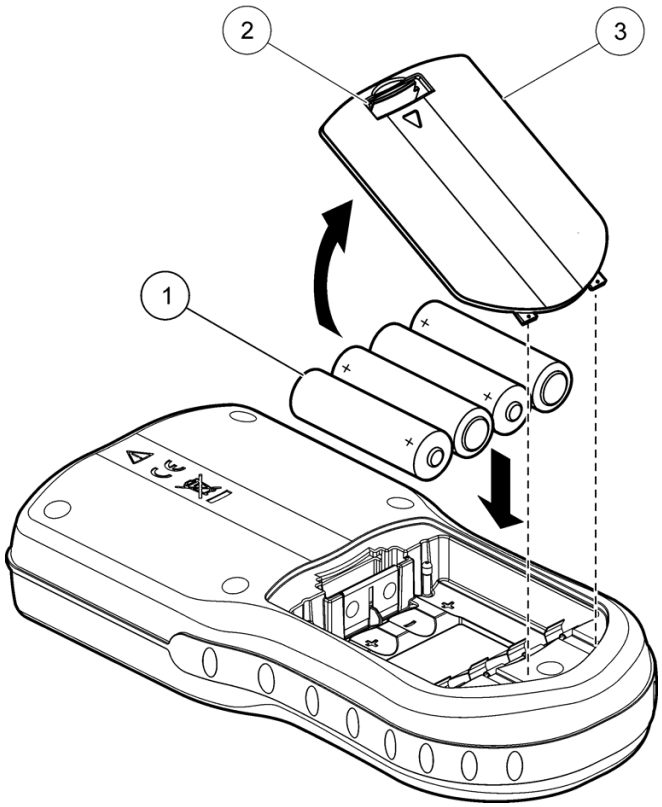


Figure 3 Battery installation

1	Batteries	**2**	Release tab	**3**	Battery cover

Important Note: *The battery cover is not waterproof. However the battery compartment will prevent water from infiltrating the meter. If the battery compartment becomes wet, remove and dry the batteries and thoroughly dry the interior of the compartment. Check the battery contacts for corrosion and clean them if necessary.*

Note: *When using nickel metal hydride (NiMH) batteries, the battery icon will not indicate a full charge after freshly charged batteries have been inserted (NiMH batteries are 1.2 V, while alkaline batteries are 1.5 V.) Even though the icon does not indicate a complete charge, 2500 mAH NiMH*

batteries will achieve 90% of instrument operation lifetime before needing recharge compared to new alkaline batteries.

3.2 Connect to AC power

DANGER
Electrocution hazard. AC power outlets in wet or potentially wet locations MUST ALWAYS be provided with a Ground Fault Circuit Interrupting (GFCI/GFI) circuit breaker. The AC-DC power adapter for this product is not sealed and must not be used on wet benches or in wet locations without GFCI protection.

The meter can be powered by AC power with an AC power adapter kit. The kit includes an AC-DC power supply, USB/DC adapter and AC power cord.

Procedure for connecting to AC power:

1. Turn the instrument off.
2. Plug the AC power cord into the AC-DC power supply (Figure 4).
3. Connect the AC-DC power supply to the USB/DC adapter.
4. Connect the USB/DC adapter to the instrument.
5. Plug the AC power cord into an AC receptacle.
6. Turn the instrument on.

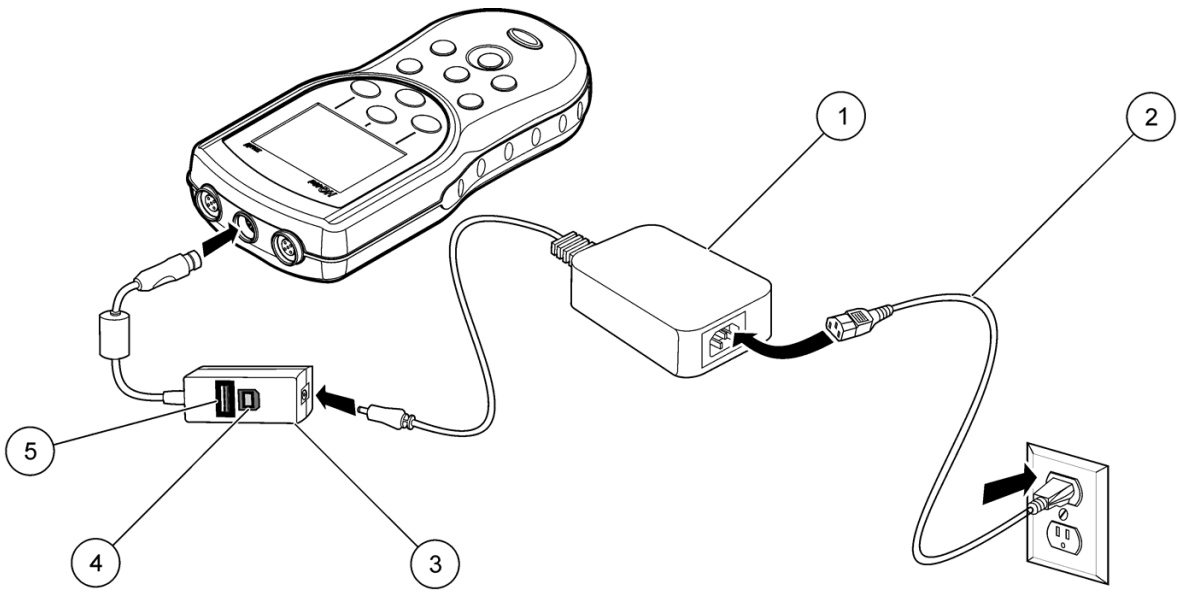


Figure 4 AC power connection

1	AC-DC power supply	**4**	Personal computer connection (USB host)
2	AC power cord	**5**	USB storage device/printer/Qwerty keyboard connection (USB peripheral)
3	USB/DC adapter		

3.3 Turn the meter on and off

Press the **ON/OFF** key to turn on or turn off the meter. If the meter does not turn on, make sure that the batteries are properly installed or that the AC-DC power supply is properly connected to an electrical outlet.

Note: *The Auto-Shutoff option can also be used to turn off the meter. Refer to* *section 6.3 on page 31**.*

3.4 Change the language

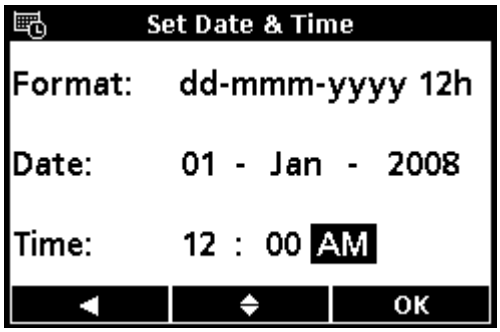
The display language is selected when the meter is powered on for the first time. The language can also be changed from the Meter Options menu. Access to the language menu can be restricted with the Security Options (refer to section 6.2 on page 29).

1. Press the **METER OPTIONS** key and select **Language**.
2. Select a language from the list.

Note: *The language can also be changed when the power key is pressed and held.*

3.5 Change the date and time

The date and time can be changed from the Meter Options menu. Access to the date and time screen can be prevented with the Security Options (refer to section 6.2 on page 29).



1. Press the **METER OPTIONS** key and select **Date & Time**.
2. Update the time and date information:

Option	Description
Format	Select one of the formats for the date and time: dd-mmm-yyyy 24h dd-mmm-yyyy 12h yyyy-mm-dd 24h yyyy-mm-dd 12h dd-mm-yyyy 24h dd-mm-yyyy 12h mm/dd/yyyy 24h mm/dd/yyyy 12h
Date	Enter the current date
Time	Enter the current time

The current date and time will be shown in the measurement screen.

3.6 Connect a probe

1. Make sure the display shows the current time and date. Refer to section 3.5.

   Note: *The time stamp for a probe is set when the probe is first connected to the meter. This time stamp makes it possible to record the probe history and record the time when measurements are made.*

2. Plug the probe into the meter as shown in Figure 5.
3. Push and turn the locking nut to tighten.

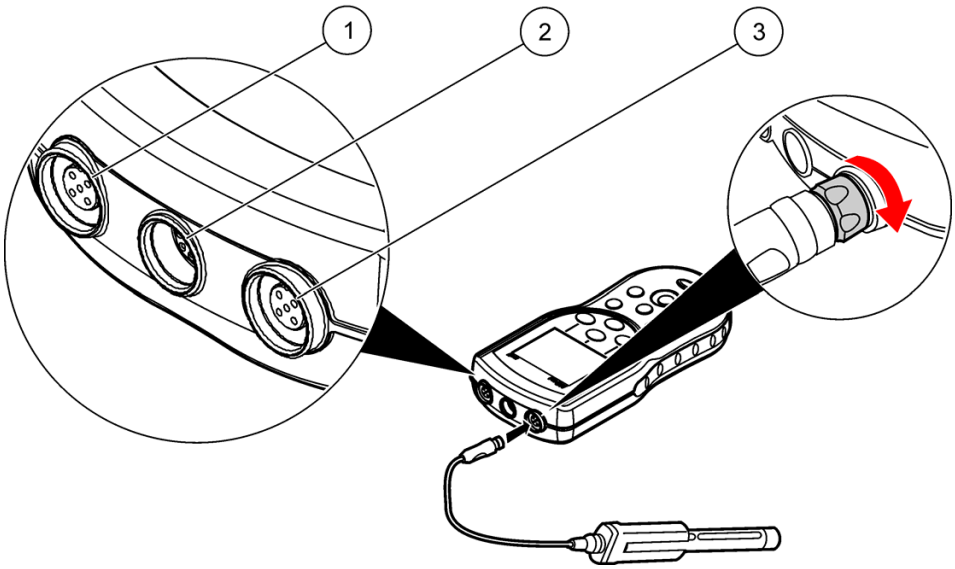


Figure 5 Probe connection

1	Probe connection port	**3**	Probe connection port
2	USB/DC adapter port		

4.1 Keypad description

The keypad and key descriptions are shown in Figure 6.

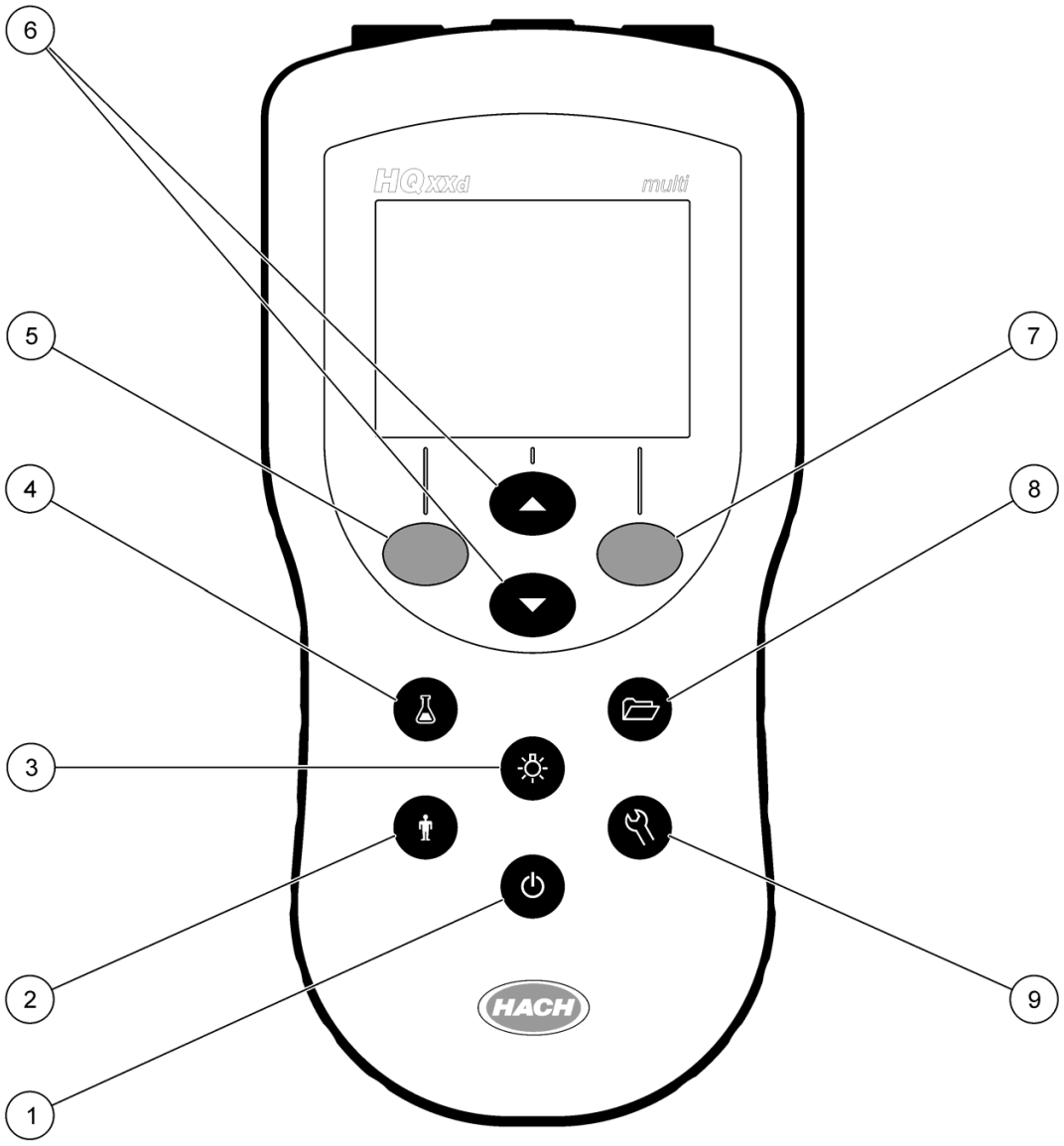


Figure 6 HQ series keypad description

1	**ON/OFF**: power on or power off the meter	**6**	**UP** and **DOWN** keys: scroll through menus, enter numbers/letters or change the read view screen.
2	**OPERATOR ID**: associate data with an individual	**7**	**GREEN/RIGHT** key: select menu options
3	**BACKLIGHT**: illuminate the display screen	**8**	**DATA LOG**: recall or transfer stored data
4	**SAMPLE ID**: associate data with a sample location	**9**	**METER OPTIONS**: change settings, run check standards, view meter information
5	**BLUE/LEFT** key: select menu options		

4.2 Display description

4.2.1 Measurement screen

The meter display shows the concentration, units, temperature, calibration status, operator ID, sample ID, date and time. Refer to Figure 7.

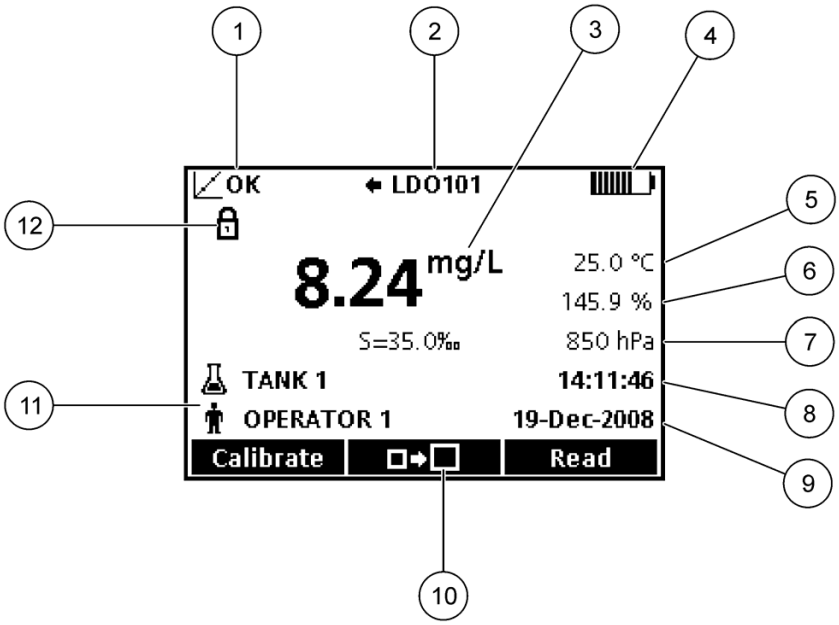


Figure 7 Single screen display

1	Calibration status indicator	**7**	Tertiary units (for some probes)
2	IntelliCAL probe type and port indicator	**8**	Time
3	Main measurement unit	**9**	Date
4	Battery status or power source	**10**	Display size icon
5	Sample temperature (ºC or ºF)	**11**	Sample and operator identification
6	Secondary measurement unit	**12**	Stability or display lock indicator

4.2.2 Big-screen mode

The size of the sample reading can be increased or decreased with the **UP** key. Refer to Figure 8.

Note: *When two probes are connected, press and hold the **UP** key to select the big-screen mode. The big-screen mode can also be selected in the Display Options menu (section 6.3 on page 31).*

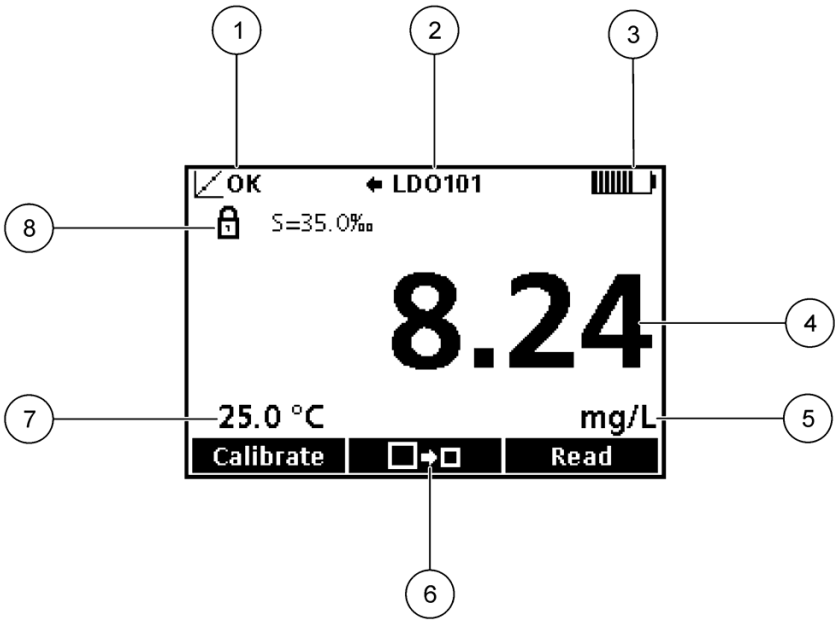


Figure 8 Single-screen display—big-screen mode

1	Calibration status indicator	**5**	Main measurement unit
2	IntelliCAL probe type and HQ40d port indicator	**6**	Display size icon
3	Battery status or power source	**7**	Sample temperature (ºC or ºF)
4	Main measurement value	**8**	Stability or display lock indicator

4.2.3 Dual-screen mode (HQ40d model only)

When two probes are connected to the HQ40d meter, the display can show the reading from both probes simultaneously, or show just one probe (Figure 7). Refer to Figure 9 for a description of the dual-screen display.

To change the screen mode to single or dual screen, use the **UP** and **DOWN** keys. In dual screen mode, the **UP** key will select the probe on the left and the **DOWN** key will select the probe on the right.

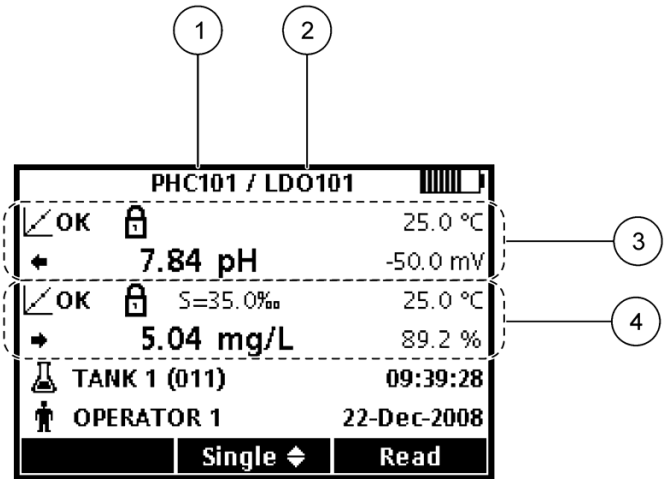


Figure 9 Dual-screen display

1	Probe that is connected to port on left	**3**	Measurement information for probe on left
2	Probe that is connected to port on right	**4**	Measurement information for probe on right

4.3 Navigation

The meter contains menus to change various options (Figure 10). Use the **UP** and **DOWN** keys to highlight different options. Press the **GREEN/RIGHT** key to select an option.

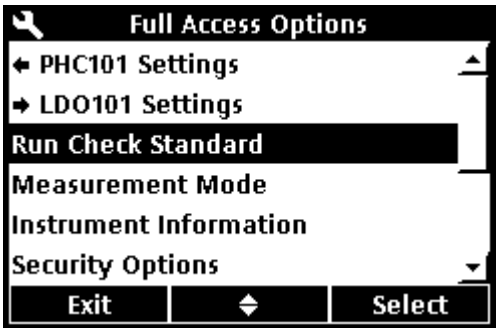


Figure 10 Typical menu screen

There are two ways to change options:

1. Select an option from a list (Figure 11):

Use the **UP** and **DOWN** keys to select an option. If check boxes are shown, more than one option can be selected. Press the **GREEN/RIGHT** key under **OK**.

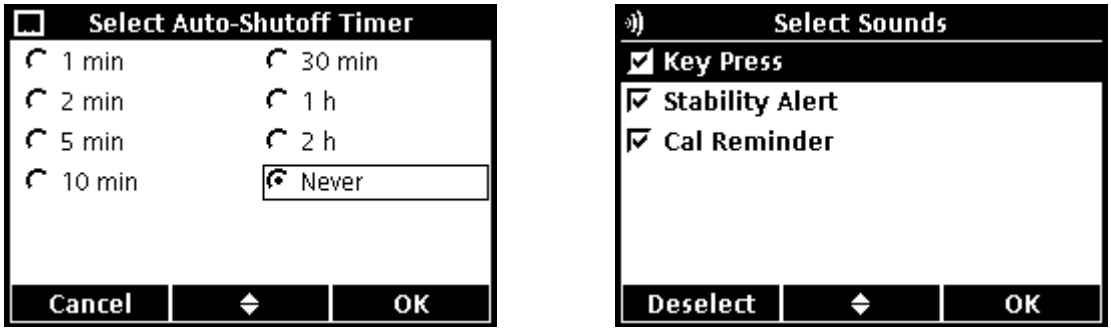


Figure 11 Single or multiple option selection from a list

2. Enter an option value using the arrow keys (Figure 12):

Press the **UP** and **DOWN** keys to enter or change a value. Press the **GREEN/RIGHT** key to advance to the next space. Press the **GREEN/RIGHT** key under **OK** to accept the value.

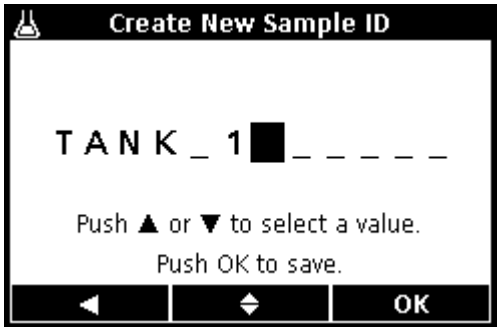


Figure 12 Enter or change an option value

4.4 Use a sample ID

The sample ID tag is used to associate sample measurements with a particular sample location. All stored data will include this ID.

1. Press the **SAMPLE ID** key.
2. Add, change or delete a sample ID:

Option	Description
Current ID	Select an ID from a list. The current ID will be associated with sample data until a different ID is selected.
Create a New Sample ID	Enter a name for a new sample ID
Delete Sample ID	Delete an existing sample ID

4.5 Use an operator ID

The operator ID tag associates sample measurements with an individual operator. All stored data will include this ID.

1. Press the **OPERATOR ID** key.
2. Add, change or delete an operator ID.

Option	Description
Current ID	Select an ID from a list. The current ID will be associated with sample data until a different ID is selected.
Create a New Operator ID	Enter a name for a new operator ID
Delete Operator ID	Delete an existing operator ID

4.6 About calibration

Each probe uses a different type of calibration solution. For step-by-step calibration instructions, refer to the documents that are included with each probe.

4.7 About sample measurements

Each probe has specific preparation steps and procedures for taking measurements. For step-by-step instructions, refer to the documents that are included with the probe.

4.8 About check standards

Run Check Standards verifies equipment accuracy by measuring a solution of known value. The meter will indicate if the Check Standard passed or failed. If the Check Standard fails, the calibration icon and **CAL?** is shown until the probe is calibrated.

The meter can be set to automatically show a reminder for check standard measurement at a specified interval with a specified acceptance criteria. The reminder, value of the check standard, and acceptance criteria can be changed. For step-by-step instructions, refer to the documents that are included with the probe.

Section 5 Stored data options

5.1 Stored data options

5.1.1 About stored data

The following types of data are stored in the Data Log:

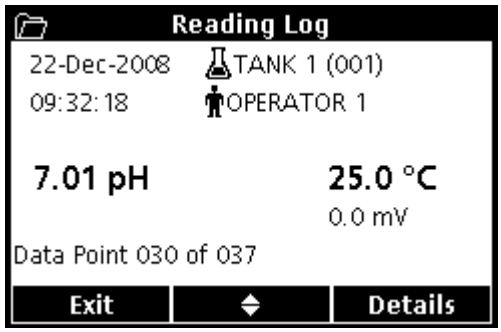
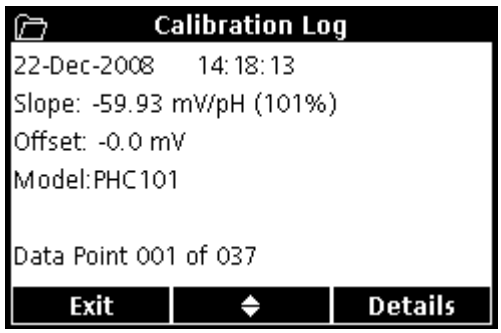
- **Sample measurements**—stored automatically each time a sample is measured. When the continuous measurement mode is used, data is stored only when **Store** is selected.
- **Calibrations**—stored only when **Store** is selected at the end of a calibration. Calibration data is also stored in the probe.
- **Check standard measurements**—stored automatically each time a check standard is measured (in the Press to Read or Interval Mode).

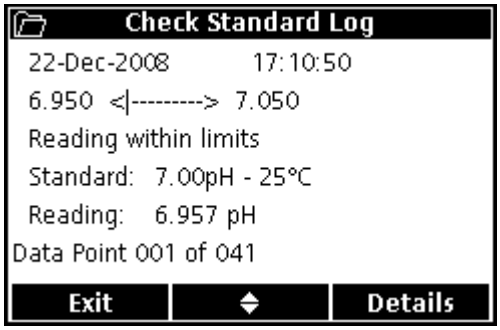
When the data log becomes full (500 data points), the oldest data point is deleted when more data is added to the log. The entire data log can be deleted to remove data that has already been sent to a printer or PC (**DATA LOG** > **Delete Data Log**). To prevent deletion of the data log, use the Security Options menu.

5.1.2 View stored data

The data log contains sample data, calibrations and check standard data. The most recent data point in the data log is tagged as 001.

1. Press the **DATA LOG** key.
2. Select **View Data Log**. The most recent data is shown. The top of the screen shows whether the data is from a sample reading, a calibration or a check standard. Press the **DOWN** key to view the next most recent data point.

Option	Description
	The reading log shows sample measurements including the time, date, operator and sample ID. Select **Details** to view the associated calibration data.
	The calibration log shows calibration data. Select **Details** to view additional information about the calibration.

	The check standard log shows check standard measurements. Select **Details** to view the calibration data that was associated with the measurement.

3. To view the calibration data that is stored in a probe, press the **DATA LOG** key and select **View Probe Data**. The current calibration and calibration history for the probe can be viewed.

   Note: *Make sure that a probe is connected to the meter. If two probes are connected, select the appropriate probe when prompted.*

Option	Description
View Current Calibration	The current calibration information shows the calibration details for the most recent calibration. If the probe has not been calibrated by the user, the factory calibration data is shown.
View Calibration History	The calibration history shows a list of the times when the probe was calibrated. Select a date and time to view a summary of the calibration data.

5.1.3 Print stored data

All data can be sent to a printer. The PD-2 Citizen Printer is compatible with the HQd meters and is FCC Part 15B, Class B compliant with the HQ meters. Other printers may not be compatible. Compatible printers should support a minimum of 72 columns of data, be capable of printing up to 500 continuous data-stream events in 1, 2, and 3 lines of text and fully support code page 437 and code page 850.

1. Turn off the meter. Connect the USB/DC adapter to the meter and to AC power.

   Note: *The USB/DC adapter must connect to AC power to open the USB connection. Make sure that the connection to AC power is made before the meter is powered on.*

2. Connect the printer to the USB/DC adapter and to power. Refer to Figure 13.
3. Press the **DATA LOG** key.
4. Select **Send Data Log**. Wait for the display to show “Transfer Complete” and wait for the printer to stop printing. Disconnect the printer.

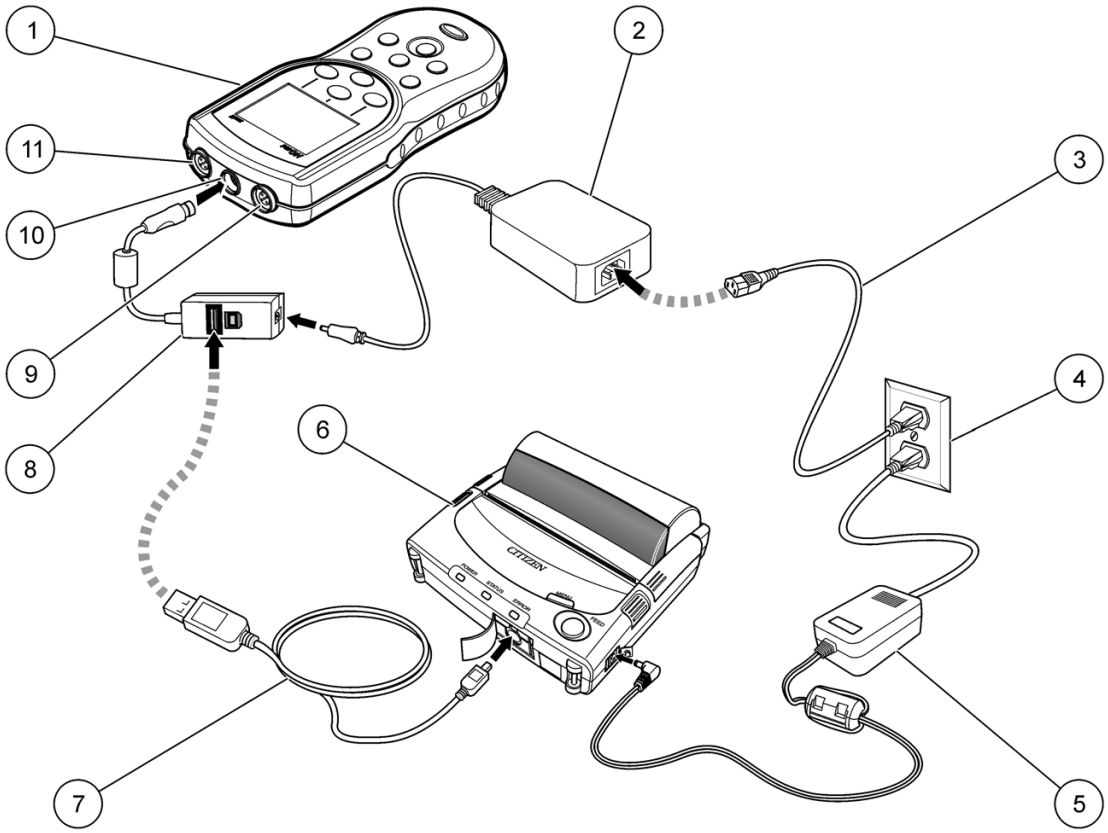


Figure 13 Connection to printer

1	HQd meter	**7**	USB cable
2	Power adapter	**8**	USB/DC adapter
3	Power cord	**9**	Port for probe connection
4	AC power outlet	**10**	Port for USB/DC adapter
5	Power supply for printer (optional)	**11**	Port for probe connection
6	Citizen Printer, FCC Part 15B, Class B compliant		

5.1.3.1 Change the report options

Printed reports for sample data can contain 1, 2 or 3 lines of information.

1. Press the **DATA LOG** key. Select **Report Options**.
2. Select **Report Type** and select one of the options.

Option	Description
Basic report	One line of data.
Advanced report	Two lines of data. The first line contains the same information as in the basic report.
Total report	Three lines of data. The first two lines contain the same information as in the advanced report.

5.1.3.2 Examples of printed reports

Printed reports contain a report header and all stored data for samples, check standards and calibrations.

Report header
The first line of a report shows the report header (Figure 14).

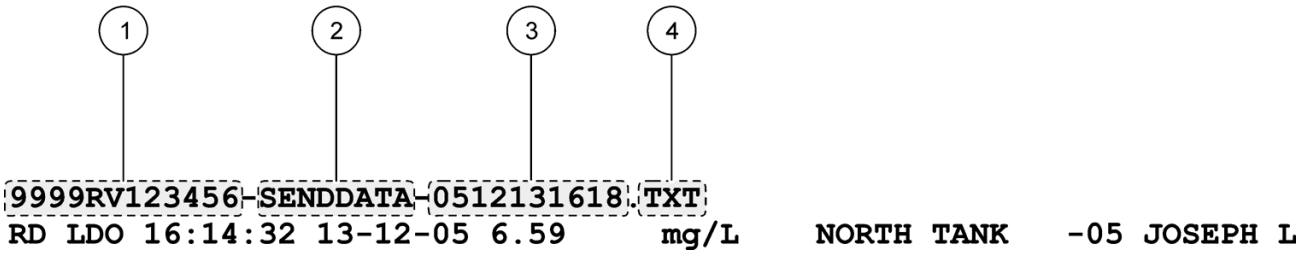


Figure 14 Report header

1	Meter serial number[1]	**3**	Date and time, 24 h (YYMMDDhhmm)
2	Report label	**4**	File type extension

[1] The probe serial number is shown on calibration history and current calibration reports.

Data reports
Sample data can be printed in a basic, advanced or total report format.

Basic report—refer to Figure 15.

Advanced report—refer to Figure 16.

Total report—refer to Figure 17.

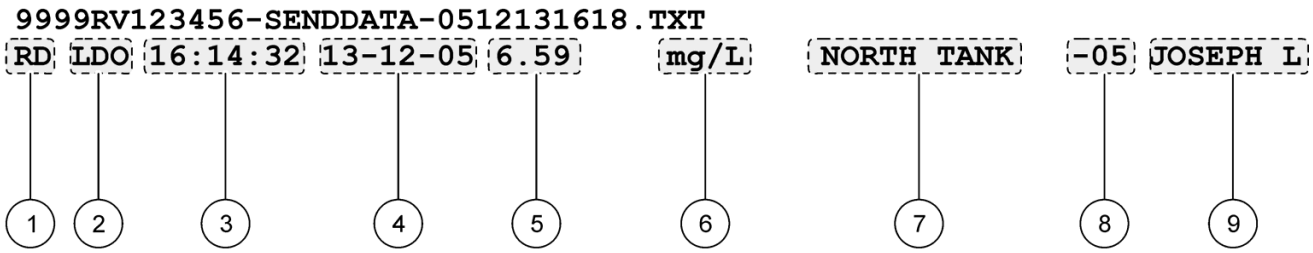


Figure 15 Basic report for sample data—1 line

1	Data type (RD=reading)	**6**	Units
2	Parameter (pH, LDO, etc.)	**7**	Sample ID: user-defined; shows “SAMPLE ID” if undefined
3	Time (hh:mm:ss in 24 h or user-defined format)	**8**	Sample ID counter
4	Date (DD-MM-YY or user-defined format)	**9**	Operator ID: user-defined; shows “- - -” if undefined
5	Measured value		

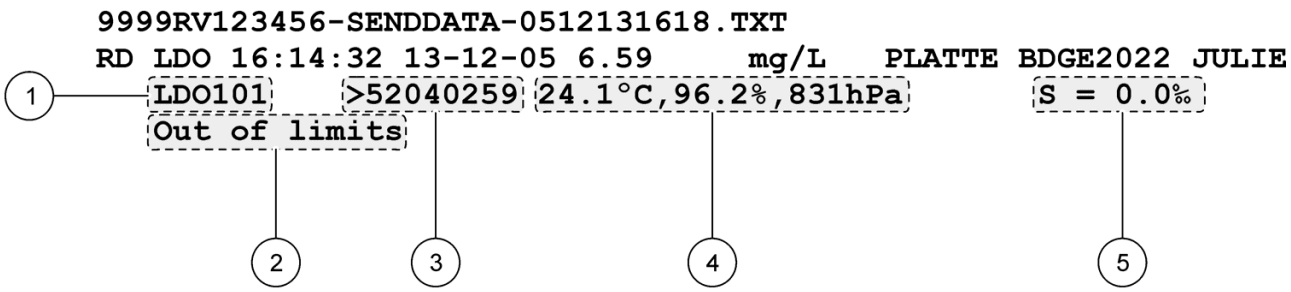


Figure 16 Advanced report for sample data—2 lines

1	Probe model	**4**	Additional units: shows all additional units associated with the reading.
2	Error message (if applicable)	**5**	Probe settings: shows the highest-priority setting associated with the reading
3	Probe serial number (a “<“ or “>” on the HQ40d meter indicates the probe position)		

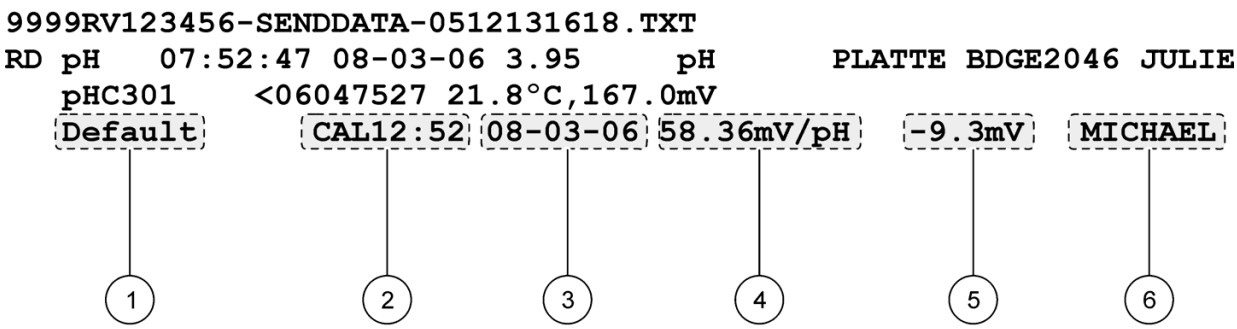


Figure 17 Total report for sample data—3 lines

1	Method name for probe settings	**4**	Calibration slope/ratio/constant
2	Time of calibration, prefaced by “CAL” and displayed as hh:mm in 24 h (or user-defined) format	**5**	Offset—contents vary depending on type of parameter and user settings. May be blank.
3	Date of calibration (DD-MM-YY or user-defined format)	**6**	Operator ID: user-defined; shows “- - -” if undefined

Check standard reports

Check standard data is printed with 1 line of information (Figure 18.)

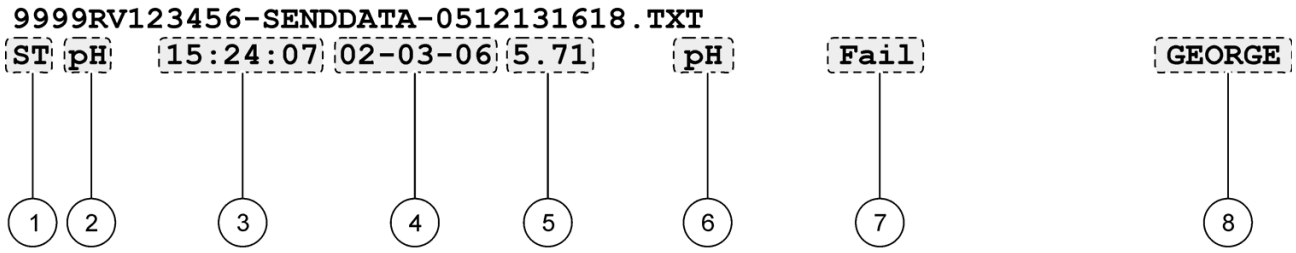


Figure 18 Check standard report

1	Report type (ST = check standard)	**5**	Measured value
2	Parameter (pH, LDO, etc.)	**6**	Units
3	Time (hh:mm:ss in 24 h or user-defined format)	**7**	Check standard status: Pass/Fail based on the acceptance criteria
4	Date (DD-MM-YY or user-defined format)	**8**	Operator ID: user-defined; shows “- - -” if undefined

Calibration reports

Calibration data is printed when the data log is sent to the printer or when probe data is sent to the printer. Calibration data is printed with 2 lines of information (Figure 19).

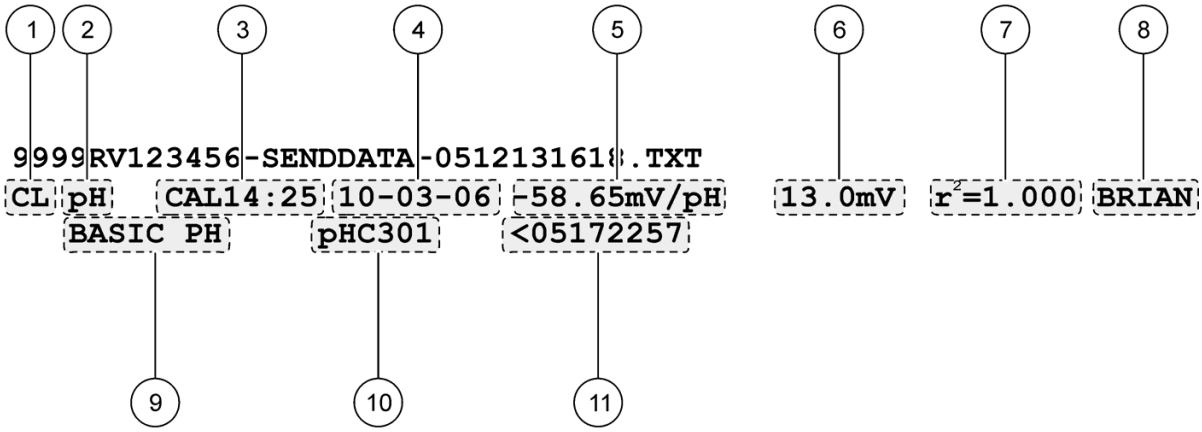


Figure 19 Calibration report

1	Report type (CL = calibration, IC = current calibration)	**7**	r²: contents vary depending on type of parameter being read, configuration of specific method and number of calibration standards used. May be blank.
2	Parameter (pH, LDO, etc.)	**8**	Operator ID: user-defined; shows “- - -” if undefined
3	Time of calibration, prefaced by “CAL” and displayed as hh:mm in 24 h (or user-defined) format	**9**	Method name for probe settings
4	Date of calibration (DD-MM-YY or user-defined format)	**10**	Probe model
5	Calibration slope/ratio/constant	**11**	Probe serial number (a “<“ or “>” on the HQ40d meter indicates the probe position)
6	Offset—contents vary depending on type of parameter and user settings. May be blank.		

The calibration history can be printed from the probe data menu. Refer to Figure 20.

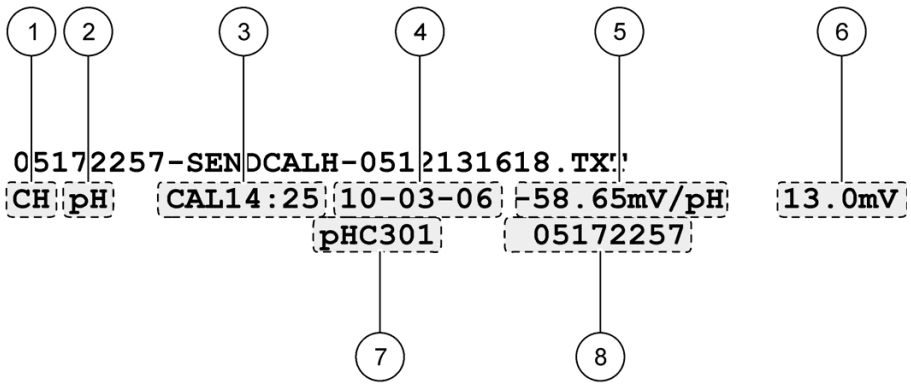


Figure 20 Calibration history report

1	Report type (CH=calibration history)	**5**	Calibration slope/ratio/constant
2	Parameter (pH, LDO, etc.)	**6**	Offset—contents vary depending on type of parameter and user settings. May be blank.
3	Time of calibration, prefaced by “CAL” and displayed as hh:mm in 24 h (or user-defined) format	**7**	Probe model
4	Date of calibration (DD-MM-YY or user-defined format)	**8**	Probe serial number (a “<“ or “>” on the HQ40d meter indicates the probe position).

5.1.4 Transfer data to a USB storage device

5.1.4.1 Send data to a USB storage device

Important Note: *The transfer of a large number of files will take some time. DO NOT disconnect the USB storage device until the transfer is complete.*

Data can be transferred to a USB storage device for storage or transfer to a computer.

1. Turn off the meter. Connect the USB/DC adapter to the meter and to AC power. Refer to section 3.2 on page 10.

   Note: *The USB/DC adapter must connect to AC power to open the USB connection. Make sure that the connection to AC power is made before the meter is turned on.*

2. Plug the USB storage device into the USB/DC adapter before the meter is powered on.
3. Turn on the meter.

4. Press the **DATA LOG** key.
5. Select **Send Data Log**. Wait for the display to show “Transfer Complete” and for any lights on the USB storage device to stop flashing. Then remove the USB device.

   Note: *If the data transfer is slow, reformat the USB storage device to use the file allocation table (FAT) format for the next use.*

5.1.4.2 Open data files on a PC

Data that has been downloaded to a USB storage device can be transferred to a computer. The data is sent in a text (.txt) file format.

1. Plug the USB storage device into the computer.
2. Find the data file. The file will have the following format: “Meter Serial Number-Data File Type-Date Time”.
   Example: 9999NN000000-SENDDATA-0603131624.TXT
3. Save the data file to a location on the computer.
4. Open a spreadsheet program such as Microsoft® Excel® spreadsheet software.
5. Open the data file from the spreadsheet program. Select the delimited option with comma as the delimiter.
   The data will be shown in the spreadsheet program.

Note: *If an application is used that is not compatible with column headings, the headings can be omitted. Refer to section 5.1.4.4 on page 27.*

5.1.4.3 Data file description

Data that is saved to a USB storage device and then opened in a spreadsheet application will have numerous columns of data. A description for each of the columns is shown in Table 1.

Table 1 Spreadsheet column descriptions

Column header name	Data description and example values
Type	Type of data: RD = Reading; CL = Calibration; CK = Check Standard; CH = Calibration History; IC = Current Calibration
Parameter Type	Parameter: LDO, pH, CD (conductivity), ORP, ISE
Date	Date of reading: stored in user-defined date format
Time	Time of reading: stored in user-defined format
Operator ID	Operator ID that was used when the data was recorded. Shows “- - -” if the default operator ID is used.
Probe Model	Model number of probe, for example pHC101, CDC401, LDO101
Probe SN	Probe serial number If two probes are connected to the HQ40d meter, the serial number shows “<“ or “>” to identify the port the probe was connected to during the reading.
Method name	User-defined name of the probe settings that were used for the reading.
Sample ID	Sample ID that was used when the data was recorded. Shows "Sample ID" if the default sample ID is used.
Primary Reading Value	Measured value. Shows “—" if the value was out of range.
Primary Reading Units	Measurement units, for example pH or mS/cm
Supp Reading 1	First supplemental reading (example: temperature), if applicable
Supp Units 1	Units for first supplemental reading, if applicable.
Supp Reading 2	Second supplemental reading (example: “mV” for pH), if applicable
Supp Units 2	Units for second supplemental reading, if applicable
Supp Reading 3	Third supplemental reading, if applicable
Supp Units 3	Units for third supplemental reading, if applicable.
Reading Setting 1–4	Any settings that affect the reading, for example “NaCl/Non-Linear”
Reading Message 1–4	Any message that was shown during the measurement, for example “Out of limits”.
Check Std Value	Value of the check standard that was used to verify accuracy, for example: 7.00 pH–25 ºC (pH, temp-compensated); 7.01 pH (pH, custom)
Check Std Units	Check standard units, for example µS/cm. ***Note:*** *pH is not displayed here as it is included in the previous column.*
Check Std Graph	Bar-graph showing the measurement in relation to the acceptance limits. Example: “6.901 <—|—> 7.101”.
Check Std Status	Status of the check standard reading. Example: “Reading within limits”, “Reading outside limits”
Calibration Status	Status of the calibration that is in use. OK = current calibration is valid; ? = calibration has expired.
Cal Date	Date of calibration reading: stored in user-defined date format
Cal Time	Time of calibration reading: stored in user-defined time format
Cal Operator ID	The operator ID specified when the probe was calibrated. Shows “- - -” if undefined.
Cal Slope Name	Slope (pH or LDO) or cell constant (conductivity)
Cal Slope	The slope value for the calibration
Cal Slope Aux	Used by pH to give the percent of nominal slope
Cal Slope Units	Units of the calibration slope. Example: “mV/pH” for pH
Cal Offset	Calibration offset value

Table 1 Spreadsheet column descriptions (continued)

Column header name	Data description and example values
Cal Offset Units	Calibration offset units. Example: “mV” for pH.
Cal r^2	Unitless calibration correlation coefficient (may be blank)
Cal Number of Std’s	Number of standards used during calibration, for example 5. May be blank depending on record type, parameter type, and method settings.
Cal Std 1	Known value of the first calibration standard
Cal Std 1 Units	Units of the first calibration standard
Cal Std 1 Primary Value	Measured value of the first calibration standard
Cal Std 1 Primary Units	Associated units for the calibration measurement
Cal Std 1 Supp Value	Value of supplemental measurement, for example temperature
Cal Std 2–7	Known value of additional calibration standards, if used
Cal Std 2–7 Units	Units of additional calibration standards, if used
Cal Std 2–7 Primary Value	Measured values of additional calibration standards, if used
Cal Std 2–7 Primary Units	Associated units for additional calibration measurements, if used
Cal Std 2–7 Supp Value	Value of supplemental measurement, for example temperature
Cal Std Supp Units	Units applicable to all secondary calibration readings. Example: “ºC” or “ºF” for temperature
Cal Message 1–4	Any messages about the calibration
Date/Time POSIX	Date and time of reading stored in POSIX format (number of seconds from January 1, 1970) Example: 1149234913
Cal Date/Time POSIX	Date and time of calibration stored in POSIX format (number of seconds from January 1, 1970). Example: 1111320348
Meter SN	Meter serial number

5.1.4.4 Remove column headers

When transferred data is viewed in a spreadsheet program, the first row of data contains headings to identify the type of data in each column. If an application or post-processing method is used that is incompatible with the headers, the column headers can be omitted.

1. Press the **DATA LOG** key.
2. Select **Column Headers**.
3. Set the column headers to off.

5.1.5 Send data directly to a computer

Data can be transferred from any HQd series meter directly to a computer when the HQ40d PC Application is installed. The data can be sent in real time during data collection, or the entire data log can be transferred.

Note: *The HQ40d PC Application is included on the HQd/IntelliCAL™ Documentation and Advanced Operations CD. The application is also available on http://www.hach.com/SoftwareDownloads.*

1. Install the HQ40d PC Application on the computer.
2. Turn off the meter. Connect the USB/DC adapter to the meter and to AC power. Refer to section 3.2 on page 10.

   Note: *The USB/DC adapter must connect to AC power to open the USB connection. Make sure that the connection to AC power is made before the meter is powered on.*

3. Connect a USB cable to the USB/DC adapter and to the computer.
4. Turn on the meter.
5. Open the HQ40d PC Application on the computer. Click on the green triangle in the menu bar to start a connection.
6. Collect the data in real time or transfer the data from the data log:
   - Real time—when a data point is stored in the meter, the result is sent simultaneously to the PC Application (refer to section 6.6 on page 32).
   - Data log—press the **DATA LOG** key and select **Send Data Log**. Wait for the display to show “Transfer Complete.” The data is sent as a comma separated values (.csv) file.

The data is shown in the HQ40d PC Application window.

Section 6 Advanced operations

6.1 Advanced operations overview

This section contains the following tasks:

- Restrict access to some menus with a password (security options)
- Change the contrast, auto-shutoff time, backlight time or display mode
- Control whether sounds are made for key presses, stabilized readings or for calibration reminders
- Change the temperature units (°C or °F)
- Change the measurement mode: press to read, interval or continuous
- View instrument and probe information
- Update the meter software
- Transfer user settings from one meter to another

6.2 Security Options

The Security Options menu is used to protect the meter setup and parameter methods. This menu is available in the **Full Access Options** menu.

The Setup Measurement Mode, Date and Time, Temperature Units, Language, Probe settings, Delete data log and Security Options screens are disabled in the **Operator Access Options** menu. All menu options are enabled in the Full Access Options menu.

Note: *The Full Access Options menu is shown when the* ***METER OPTIONS*** *key is pressed when Security Options is OFF, whether or not a password has been set.*

When the meter is powered on for the first time and Security Options is selected, the display prompts the user to set a password. Until the meter is shut off, pressing the **METER OPTIONS** key will still display the **Full Access Options** menu, even after Security Options is turned on and a password has been set. After the meter is shut off and powered on again with Security Options on, the **Operator Access Options** menu is displayed until a valid password is entered.

Store the password in a safe and accessible place. If the specified password is forgotten and Security Options is turned on, the operator is locked out of the restricted menus. Contact technical support (800-227-4224) if the password is lost.

6.2.1 Turn Security Options on

The Security Options and the Set Password options are used together to prevent access to restricted menus.

1. Press the **METER OPTIONS** key and select **Security Options**.
2. Change the settings as needed to allow or prevent menu access.

Option	Description
Security Options	When Security Options is on, and a password has been specified, the password is required to enable the Full Access Options menu. If the meter is turned off while Security Options is on, the password is required to enable the Full Access Options menu again when the meter is turned on.
Set Password	Set a password that must be entered to enable the Full Access Options menu. The requirement for password entry is controlled by setting Security Options on or off.

6.2.2 Full access options menu

The Full Access Options menu is displayed when Security Options is OFF, or when Security Options is ON and a valid password is entered. These options do not need to be changed if the factory default settings are used.

Full Access Options (Security Options OFF or valid password entered)	
(Probe model) settings	Settings such as measurement options, calibration options, check standard options, units and resolution. Refer to the probe documentation. ***Note:*** *A probe must be connected to the meter.*
Run check standard	Measure standard solution (available for pH, conductivity, ORP and ISE probes)
Measurement mode	Press to Read
	Interval: Duration and Interval
	Continuous
Instrument information	Probe information
	Meter information
Security options	ON or OFF
	Set password
Display options	Contrast
	Auto shutoff
	Backlight
	Mode
Sounds	Key press
	Stability alert
	Calibration reminder
Date and time	Format
	Date
	Time
Temperature units	Set temperature units
Language	Select language

6.2.3 Restricted operator access options menu

The Operator Access Options menu is shown at meter startup when Security Options is ON. When a valid password is entered, the menu changes to Full Access Options.

Operator access options (Security Options ON)	
(Probe model) settings	Only methods (if methods exist) can be selected. Refer to the probe documentation. ***Note:*** *A probe must be connected to the meter.*
Run check standard	Measure standard solution (available for pH, conductivity, ORP/Redox, or ISE probes) ***Note:*** *A probe must be connected to use this option.*
Instrument information	Probe information
	Instrument information
Access password	Enter password
Display options	Contrast
	Auto-shutoff
	Backlight
	Mode
Sound	Key press
	Stability alert
	Calibration reminder

6.3 Set the display options

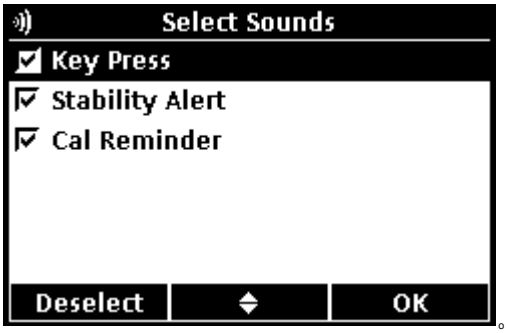
Use Display Options to change the display contrast, battery saving auto-shutoff options, the backlight option, or the detailed or big reading screen mode.

1. Press the **METER OPTIONS** key and select **Display Options**.
2. Select which display option to change.

Option	Description
Contrast	Adjust the contrast of the display. The lightest setting is 0 and the darkest setting is 9.
Auto-shutoff	To maximize battery life, set a time period after which the meter will automatically power off if no key is pressed (1, 2, 5, 10, 30 min, 1 h, 2 h, or never). Auto-shutoff is not active when the meter is connected to AC power or in the Interval Reading Mode.
Backlight	The display is illuminated when the **BACKLIGHT** key is pressed. To maximize battery life, set a time period after which the backlight will automatically power off if no key is pressed.

Mode	Select Detailed or Big screen size. Detailed will show more information with smaller numbers. Big will show less information with larger numbers. ***Note:*** *The screen size can also be selected from the measure mode (refer to section 4.2.2 on page 15).*

6.4 Set the sound options



The meter can make an audible sound when a key is pressed, when stability is reached, or when the calibration reminder is due. The meter also makes an audible sound when it begins transferring data to a USB storage device and again when the data transfer is complete.

1. Press the **METER OPTIONS** key and select **Sound**.
2. Choose which events will produce an audible sound. Multiple items can be selected.

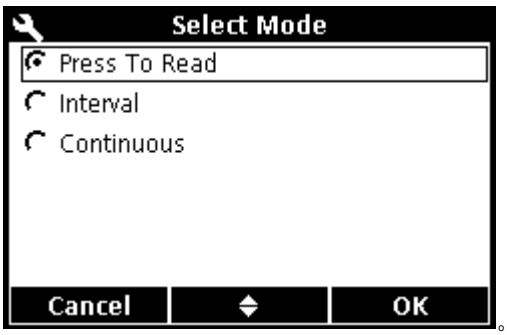
Option	Description
Key Press	The meter will make an audible sound whenever a key is pressed.
Stability Alert	The meter will make an audible sound whenever measurement stability is reached.
Cal reminder	The meter will make an audible sound when calibration is due. ***Note:*** *Refer to the probe documentation to set the calibration reminder to on or off.*

6.5 Change the temperature units

To select degrees Celsius or Fahrenheit:

1. Press the **METER OPTIONS** key and select **Temperature Units**.
2. Select the Celsius or Fahrenheit option.

6.6 Set the measurement mode

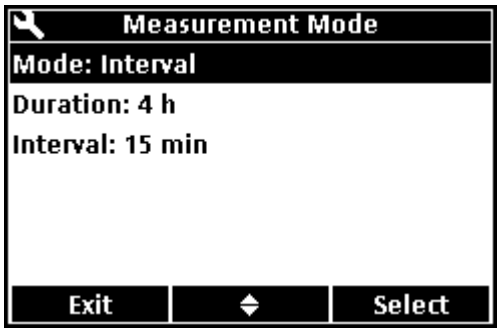


One of three modes can be used to specify when measurements are taken and how the data is stored. When a data point is stored, the result is sent simultaneously to any device (PC/printer/ USB storage device) that is connected to the USB/DC adaptor.

1. Press the **METER OPTIONS** key and select **Measurement Mode**.
2. Select **Mode**.
3. Select one of the measurement modes.

Option	Description
Press to Read	The sample is measured only when the **GREEN/RIGHT** key under **Read** is pressed. Data is stored in the Data Log automatically when the stability criteria are met.
Interval	The sample is measured at regular intervals for a specified duration (refer to section 6.6.1). Data is stored in the Data Log automatically.
Continuous	The sample is measured continuously. Data is stored in the Data Log only when the **GREEN/RIGHT** key under **Store** is pressed.

6.6.1 Set auto measurement intervals

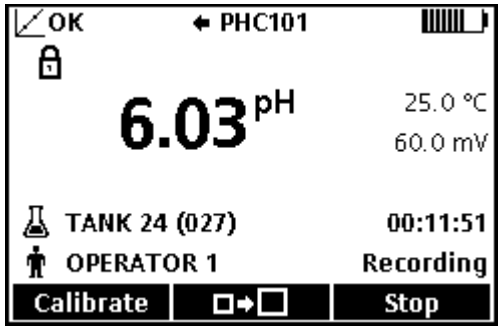


When the measurement mode is set to Interval, the time intervals and duration must be specified. Measurements are stored at the user-defined intervals whether or not stability criteria are met.

Note: *Use of an external USB storage device or direct printer connection while in Interval Measurement mode prevents data from being over-written in the data log. Data points are over-written on a First In/First Out basis. Refer to section 6.6.3 on page 34.*

1. Press the **METER OPTIONS** key and select **Measurement Mode**.
2. Select **Mode**.
3. Select **Interval** as the Measurement Mode.
4. Select **Duration** and select the total time that measurements will be taken for (15 min, 30 min, 1 h, 4 h, 8 h, 24 h, 28 h or no limit).
5. Select **Interval** and select how often measurements will be taken (every 10 s, 30 s, 1 min, 5 min, 15 min or 30 min).

6.6.2 Start interval measurements



During interval measurements, the meter goes into a standby state between readings to conserve power. The auto-shutoff option is disabled. Measurements stop when the selected interval duration has passed. The auto-shutoff option then becomes active.

Interval measurements are suspended for calibrations, check standard measurements or when the **METER OPTIONS** key is pressed. Interval measurements resume when returning to the measurement screen.

1. From the Main Measurement screen, select **Start** to begin interval measurements. The screen will show “Recording” and the remaining time of the duration. The sample number automatically advances when each reading is taken.
2. To stop interval measurements, select **Stop**.
3. To repeat the interval measurement after it has been stopped or completed, select **Start**.

6.6.3 Prevent data log overflow in interval mode

When measurements are taken at specified intervals, each result is automatically stored. The meter can store up to 500 data records. When 500 records have been stored, data is replaced on a first-in, first-out basis (FIFO). To prevent loss of data, connect the meter to a PC/printer/USB storage device.

Note: *Stop interval measurements before changes are made to a method or to meter settings.*

Table 2 Recommended interval/duration pairs to prevent data log overflow

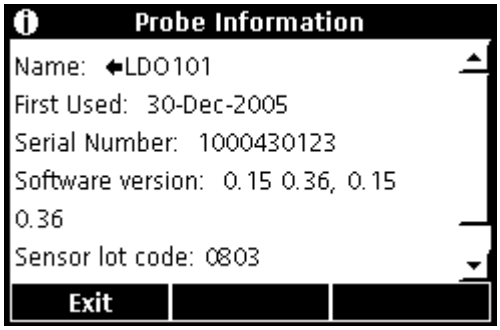
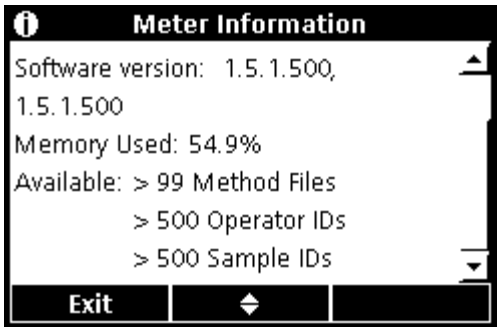
Interval	Duration[1]
10 seconds	1 hour
30 seconds	4 hours
1 minute	8 hours
5 minutes	24 hours

[1] When 2 probes are connected to the HQd40 meter, use the next lowest recommended duration time. For example, for a 30-second interval, set the duration to 1 hour to prevent data log overload with 2 probes.

6.7 View instrument information

The instrument information menu shows specific information such as the serial number for the meter or IntelliCAL probe(s).

1. Press the **METER OPTIONS** key and select **Instrument Information**.
2. Select (Probe model) Information or Meter Information.

Option	Description
	The Probe Information screen shows the probe model number, serial number, software version and date of first use. For LDO and LBOD probes, the lot code for the sensor cap and the remaining time before sensor cap replacement is shown. ***Note:*** *A probe must be connected to the meter.*
	The Meter Information screen shows the meter model number, serial number, software version and memory information. The amount of memory used and the number of available user method settings, operator IDs and sample IDs is shown.

6.8 Update the meter software

A USB storage device that contains software update files is used to update the meter software.

Note: *The meter must be turned off and then on again before the software update will begin. The sotware update initiates upon meter startup after the USB device is correctly inserted.*

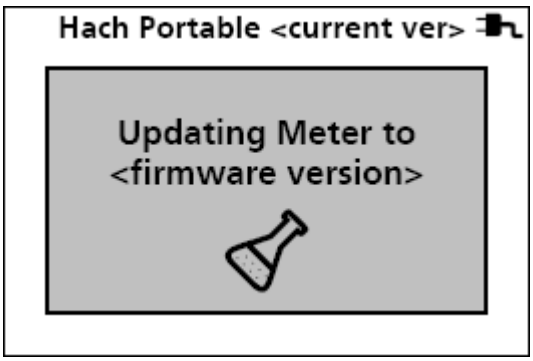
1. Save stored data to a USB storage device or to a PC. Refer to section 5.1.4.1 on page 25 and section 5.1.5 on page 27.
2. **Power off the meter**.
3. Connect the USB/DC adapter, AC-DC power supply and cord as shown in Figure 4 on page 10.
4. Insert the USB storage device that contains the software update files into the USB/DC adapter.

   Note: *USB storage devices with enabled security protection may not operate correctly.*

5. **Power on the meter**.
   The update process starts. The display will show “Updating meter to **<firmware version>”**. After an interval, the display changes to “Updating files, please wait...” In

addition, the display will show a rotating flask and emit a periodic audio signal during the update process.

Note: *A large capacity USB storage device increases the time required for completion of the update process, even if most of the device memory is empty.*



6. Wait for the meter to finish the software update.
   When the update process is complete, the message “Update complete. Remove USB device” is shown. The meter will turn off after the USB device has been removed.

Important Note: *Do not remove the USB device until the “Update complete” message is shown. The meter can become damaged if the USB device is removed before the update process is complete.*

7. Repeat steps 1 through 7 to update the software in other HQd meters as necessary.

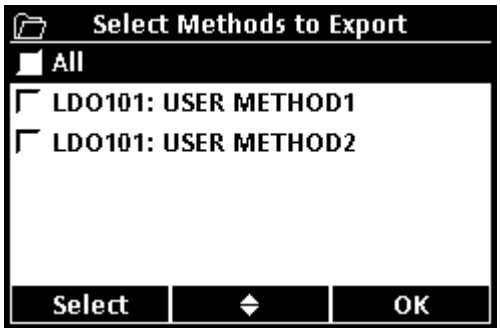
6.8.1 Download software updates

The latest software version can be obtained online:

1. Go to www.hach.com/SoftwareDownloads.
2. Click on **Lab System Software/Software Update Downloads**.
3. Click on **HQd Series Meter Software Update** and open or save the update files.
4. Open the ReadMeFirst.txt file and follow the instructions to transfer the update files to a USB storage device.
5. Follow the instructions in section 6.8 to update the software in the meter.

6.9 Transfer methods

Probe settings that have been changed by the user for measurements, calibrations or check standards (Meter Options > (Probe Model) Settings > Modify Current Settings) can be copied to a USB storage device. The USB device can then be used to transfer the settings to other HQd meters that accept the same probes.



1. **Turn off the meter**. Connect the USB/DC adapter to the meter and to AC power. Refer to Figure 4 on page 10.

   Note: *The USB/DC adapter must connect to AC power to open the USB connection. Make sure that the connection to AC power is made before the meter is powered on.*

2. Plug the USB storage device into the USB/DC adapter before the meter is powered on.

   Note: *Make sure the USB storage device does not contain software update files to prevent unintentional updates.*

3. Turn on the meter.

4. Press the **DATA LOG** key and select **Transfer Methods**.
   If the USB device already contains a method settings file, an option to export or import methods is shown. Select **Export Methods**.

5. In the **Select Methods to Export** screen, select one or more methods to copy to the USB device.
   A check mark is shown next to each selected method.

6. Select **OK**.
   The settings are copied to the USB storage device. When complete, the Transfer Summary screen is shown.

7. Connect the USB/DC adapter, AC power and USB device to a meter that will receive the method settings. Turn the meter on.

8. Press the **DATA LOG** key and select **Transfer Methods**.
   If the USB device already contains a method settings file, an option to export or import methods is shown. Select **Import Methods**.

9. In the **Select Methods to Import** screen, select one or more methods to transfer to the meter.
   A check mark is shown next to each selected method.

10. Select **OK**.
    The user settings are transferred from the USB storage device to the meter. When complete, the **Transfer Summary** screen is shown. Select details to view additional information about the transfer.

11. Disconnect the USB storage device or adapter from the meter.

Section 7 Maintenance

7.1 Cleaning the meter

The meter is designed to be maintenance-free and does not require regular cleaning for normal operation. Exterior surfaces of the meter may be cleaned as necessary.

1. Wipe the surface of the meter with a damp cloth.
2. Use a cotton-tipped applicator to clean or dry the connectors.

7.2 Battery installation

WARNING
Fire and explosion hazard. Use only alkaline or nickel metal hydride batteries in the meter. Other battery types or incorrect installation can cause a fire or explosion. Never mix battery types in the meter.

The meter can be powered with AA alkaline or rechargeable nickel metal hydride batteries. To conserve battery life, the meter will power off after 5 minutes of inactivity. This time can be changed in the Display Options menu.

Procedure for battery installation:

1. Pull the release tab on the battery cover and remove the cover (Figure 21).
2. Install 4 AA alkaline or 4 AA nickel metal hydride batteries. Make sure the batteries are installed in the correct orientation.
3. Replace the battery cover.

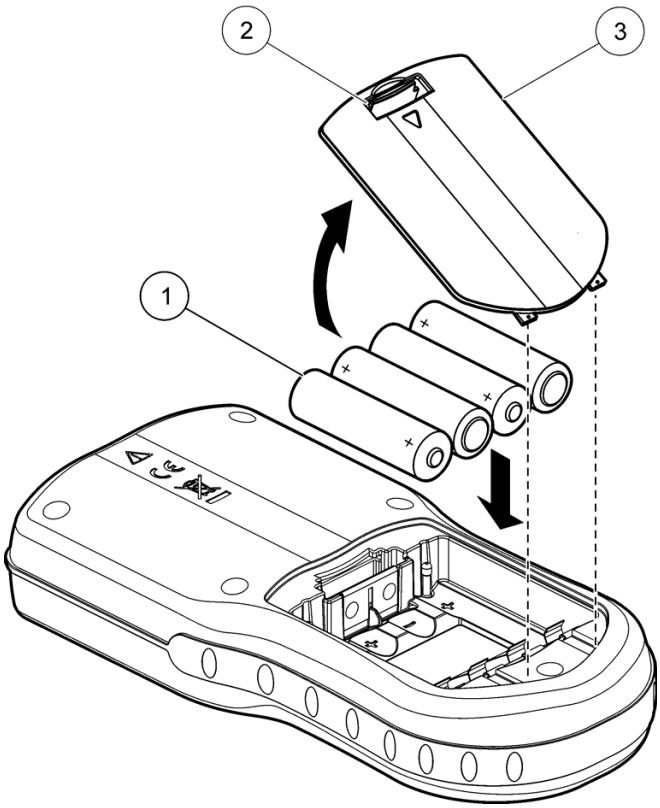


Figure 21 Battery installation

1	Batteries	**3**	Battery cover
2	Release tab		

Important Note: *The battery compartment is not waterproof. If the battery compartment becomes wet, remove and dry the batteries and thoroughly dry the interior of the compartment. Check the battery contacts for corrosion and clean them if necessary.*

Note: *When using nickel metal hydride (NiMH) batteries, the battery icon will not indicate a full charge after freshly charged batteries have been inserted (NiMH batteries are 1.2 V, while alkaline batteries are 1.5 V.) Even though the icon does not indicate a complete charge, 2500 mAH NiMH batteries will achieve 90% of instrument operation lifetime before needing recharge compared to new alkaline batteries.*

Note: *To avoid potential damage to the meter from battery leakage, remove the meter batteries prior to extended periods of non-use.*

Section 8 Troubleshooting

Refer to the following table for common problem messages or symptoms, possible causes and corrective actions.

Message or symptom	Possible cause	Action
Connect a Probe message	Probe disconnected or connected improperly	Tighten the locking nut on the probe connector.
		Disconnect the probe and then connect the probe again
	Software not updated to most current version	Update the meter software to the most current version: www.hach.com/SoftwareDownloads
	Problem with probe	Connect a different IntelliCAL probe to verify if problem is with probe or meter
Probe Not Supported message	Probe disconnected or connected improperly	Tighten the locking nut on the probe connector.
		Disconnect the probe and then connect the probe again.
	Software not updated to most current version	Update the meter software to the most current version: www.hach.com/SoftwareDownloads.
	Problem with probe	Connect a different IntelliCAL probe to the meter to verify if problem is with the meter or the probe.
	HQd meter does not support IntelliCAL probe	Contact Hach Technical Support.
Bootloader X.X.XX.XX error message	Software not updated to most current version.	Update the meter software to the most current version: www.hach.com/SoftwareDownloads.
0 days remaining message (For LDO and LBOD only)	LDO or LBOD sensor cap used for 365 days	Replace the LDO or LBOD sensor cap and I-button.
	There are 0 days remaining in the life of the LDO sensor cap.	Replace the LDO sensor cap. Calibration will be allowed. However, the calibration icon and question mark will appear on the measurement screen even if the calibration has passed.
	Meter set to incorrect date and time	**1.** Disconnect the probe from the meter. **2.** Remove the meter batteries. **3.** Install the meter batteries. Follow the polarity markings. **4.** Set correct date and time in the meter. **5.** Connect the probe and verify that message has been removed.
	Software not updated	Update the meter software to the most current version: www.hach.com/SoftwareDownloads.

Message or symptom	Possible cause	Action
Meter not configured	Software error(s)	If the meter starts up correctly, back up the Data Log and Method files. Update the meter software to the most current version: www.hach.com/SoftwareDownloads.
Meter will not power on or powers on intermittently	Batteries are not installed correctly	Examine battery orientation to make sure the batteries follow the polarity markings. Test again.
		Clean the battery terminals, then install new batteries.
		Connect AC power adapter and test again.
	Software not updated	Update the HQd software to most current version: www.hach.com/SoftwareDownloads
	Damaged meter	Contact Hach Technical Support.
Unable to access Full Access Options screen	Correct password has not been entered	Contact lab management for password or contact Hach Technical Support.
Unable to access Full or Operator Access Options screen	Software not updated	Update the meter software to the most current version: www.hach.com/SoftwareDownloads.

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Section 10 Replacement parts and accessories

10.1 Parts and accessories

Description	Quantity	Item Number[1]
AC Power/USB Adapter Kit, 115 VAC	1	5826300
AC Power/USB Adapter Kit, 230 VAC	1	5834100
Batteries, Alkaline AA	4/pkg	1938004
Battery Cover	1	5819200
Battery Contact, dual fixed	1	5188400
Battery Contact, dual spring	2	5188800
Cable, USB 6 ft. (1.8 m), Type A male, Type B male	1	5924000
Field Kit (includes Protective Glove Kit for meter and five 120-mL sample cups)	1	5825800
Field Case for 2 probes with up to 5 m cables (10 m total). Includes empty case, insert for meter and probe storage, 4 containers for sample collection.	1	8505500
Field Case for 3 probes with up to 5 m cables (15 m total). Includes empty case, insert for meter and probe storage, 4 containers for sample collection.	1	8505501
Field Case for 2 probes with greater than 5 m cables (30 m total). Includes empty case, insert for meter with protective glove.	1	8505600
Keyboard (QWERTY), USB type	1	LZV582
Printer, Citizen PD-24 USB printer, 120–220 VAC	1	2960100
Printer Paper for Citizen PD-24, thermal	5/pkg	5836000
Probe Clips, color coded (5 colors, 2 clips of each color)	10/pkg	5818400
Probe Depth Marker (rugged cables)	1	5828610
Probe Holder, standard (fits on protective glove)	1	5829400
Protective Glove Kit for meter	1	5828700
Stand for standard IntelliCAL Probes	1	8506600
Stand for HQd meter	1	4754900

[1] Item numbers may vary for some regions. Contact the appropriate distributor or see Section 9 on page 43.

10.2 IntelliCAL Probes

Description	Quantity	Item Number
IntelliCAL Conductivity Probe, standard, 1-meter cable	1	CDC40101
IntelliCAL Conductivity Probe, standard, 3-meter cable	1	CDC40103
IntelliCAL Conductivity Probe, rugged, 5-meter cable	1	CDC40105
IntelliCAL Conductivity Probe, rugged, 10-meter cable	1	CDC40110
IntelliCAL Conductivity Probe, rugged, 15-meter cable	1	CDC40115
IntelliCAL Conductivity Probe, rugged, 30-meter cable	1	CDC40130
IntelliCAL Luminescent Dissolved Oxygen (LDO) Probe, standard, 1-meter cable	1	LDO10101
IntelliCAL Luminescent Dissolved Oxygen (LDO) Probe, standard, 3-meter cable	1	LDO10103
IntelliCAL Luminescent Dissolved Oxygen (LDO) Probe, rugged, 5-meter cable	1	LDO10105
IntelliCAL Luminescent Dissolved Oxygen (LDO) Probe, rugged, 10-meter cable	1	LDO10110
IntelliCAL Luminescent Dissolved Oxygen (LDO) Probe, rugged, 15-meter cable	1	LDO10115
IntelliCAL Luminescent Dissolved Oxygen (LDO) Probe, rugged, 30-meter cable	1	LDO10130
IntelliCAL ORP/Redox Gel Electrode, standard, 1-meter cable	1	MTC10101
IntelliCAL ORP/Redox Gel Electrode, standard, 3-meter cable	1	MTC10103
IntelliCAL ORP/Redox Gel Electrode, rugged, 5-meter cable	1	MTC10105

10.2 IntelliCAL Probes (continued)

Description	Quantity	Item Number
IntelliCAL ORP/Redox Gel Electrode, rugged, 10-meter cable	1	MTC10110
IntelliCAL ORP/Redox Gel Electrode, rugged, 15-meter cable	1	MTC10115
IntelliCAL ORP/Redox Gel Electrode, rugged, 30-meter cable	1	MTC10130
IntelliCAL ORP/Redox Refillable Electrode, standard, 1-meter cable	1	MTC30101
IntelliCAL ORP/Redox Refillable Electrode, standard, 3-meter cable	1	MTC30103
IntelliCAL pH Gel Electrode, standard, 1-meter cable	1	PHC10101
IntelliCAL pH Gel Electrode, standard, 3-meter cable	1	PHC10103
IntelliCAL pH Gel Electrode, rugged, 5-meter cable	1	PHC10105
IntelliCAL pH Gel Electrode, rugged, 10-meter cable	1	PHC10110
IntelliCAL pH Gel Electrode, rugged, 15-meter cable	1	PHC10115
IntelliCAL pH Gel Electrode, rugged, 30-meter cable	1	PHC10130
IntelliCAL pH Refillable Electrode, standard, 1-meter cable	1	PHC30101
IntelliCAL pH Refillable Electrode, standard, 3-meter cable	1	PHC30103
IntelliCAL pH Electrode for Low Ionic Strength samples, standard, 1-meter cable	1	PHC28101
IntelliCAL pH Electrode for Low Ionic Strength samples, standard, 3-meter cable	1	PHC28103
IntelliCAL Sodium (Na^+) ISE Electrode, standard, 1-meter cable	1	ISENA38101
IntelliCAL Sodium (Na^+) ISE Electrode, standard, 3-meter cable	1	ISENA38103

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